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Healthworkers' motivation in low and middle income countries: A systematic review of the literature

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Abstract

Policy-makers should use what is already known about healthworkers' motivations in low and middle income countries (LMICs) to improve such workers' availability and performance. To synthesise what is already known a systematic literature review was conducted. Of the 4341 articles located, 73 articles met the review's inclusion criteria. Using the information contained in these 73 articles a new evidenced-based framework was developed to summarise the factors affecting healthworkers' motivations in LMICs. The new framework includes six thematic areas: working conditions (54 studies), financial incentives (46 studies), social incentives (37 studies), career development (31 studies) and living conditions (28 studies). As in previous reviews there is a lack of evidence regarding the effectiveness of interventions for improving healthworkers' motivation. Directions for future research are highlighted.

Keywords: healthcare, health workforce, motivation, performance, quality, retention

Healthworkers' motivation in low and middle income countries: A systematic review of the literature

At least 2.28 healthworkers per 1000 people in a country's population are needed to sustain a good healthcare system (WHO, 2007, 2006). Unfortunately, many low and middle income countries (LMICs) have less than 1 healthworker per 1000 people (Kinfu et al., 2009). Recruiting new healthworkers is only part of the solution; they must also perform well (Fritzen, 2007). Past research notes that even healthworkers who know how to perform well often lack the motivation to do so (Das, Hammer & Leonard, 2008; Das & Hammer, 2005; Leonard & Masatu, 2005).

Work motivation can be affected by intrinsic and extrinsic factors. Intrinsic motivation can be shaped by people's interest in the work itself (Gagnè & Deci, 2005), while extrinsic motivation can be shaped by features policy-makers can more easily change such as pay.¹ Increasing healthworkers' motivation in LMICs can be challenging, because many extrinsic factors can be difficult to change (Abegunde et al., 2007).

To help policy-makers increase healthworkers' motivation Willis-Shattuck et al. (2008) developed an evidenced-based framework to guide the design and implementation of motivational interventions. The framework includes seven themes: financial rewards, career development, continuing education, hospital infrastructure, resource availability, recognition/appreciation, and other.² The framework was informed by 20 articles published between 1980 and 2007; much has been published since. Whether the framework adequately describes more recent research is an open question.

To ensure policy-makers have a more current framework to design and implement motivational interventions, the current article has two aims: (1) to provide a more recent systematic literature review, and (2) to identify the best evidence-based avenues for new motivational interventions. Gaps in the available evidence are highlighted to direct future research.

¹ The complex relationship between intrinsic and extrinsic motivational factors itself is out of the scope of this article. See Gagnè & Deci, 2005 for a theoretical discussion.

² Subsequent reviews examined the narrower problem of rural attraction and retention of healthworkers (Barnighausen & Bloom, 2009; Dolea, Stormont & Braichet, 2010; Wilson et al., 2009).

Methods

A systematic literature review was preformed using Khan et al.'s five step method (2003). A narrative literature review was not used, because such is more likely to be biased (Hunt & McKibbin, 1997). A meta-analysis was not used, because the heterogeneity of the studies meant that such would not be meaningful. Articles included in the review had to: (1) address motivation of healthworkers in LMICs, (2) include the measurements of healthworkers' reactions to malleable variables, (3) be written in English, and (4) be published between 2002 and 2015.

Relevant articles were first located using PubMed and Web of Knowledge. The keywords used to locate articles included terms used by researchers to describe motivation, healthworkers, and LMICs, as outlined in Table 1. Additional articles were located by manually reviewing *Human Resources for Health's* online archive. Selected articles' references were manually reviewed to identify further articles. Articles of all quality levels were included, because different types of interventions are amenable to different experimental methods that may be less or more rigorous qualitatively speaking (Petticrew & Roberts, 2008).

To extract data from the articles a template was designed to pull out the studies' characteristics (e.g., country) and the factors identified as affecting motivation (Appendix A). When extracting data from surveys only factors that at least a third of participants cited were extracted. When extracting data from correlations and discrete choice experiments (DCEs) only statistically significant factors were extracted. When extracting data from articles including both developed and developing countries, where possible, only the developing countries' data were extracted.

Results

The search initially located 4341 articles, 4010 were excluded after reviewing the titles, 180 were excluded after reading the abstracts, and 78 were excluded after reading of the full-text. The

remaining 73 articles were included in this review. Figure 1 presents a flow diagram of this search. Appendix B provides summaries of each of the 73 identified articles.

Most articles were published after Willis-Shattuck's et al.'s (2008) review. For the years included in Willis-Shattuck's review (2002-2007), 2.7 articles on average were published each year. In the years since (2008-2015), 9.5 articles on average were published each year.

The methods described by the articles differed. The most used method was surveys (22), followed by interviews (16), discrete choice experiments (9), focus groups (8), literature reviews (6), observations (6), and interventions (6). Geographically most studies were conducted in Africa (49), followed by Pacific and Asia (10), India and Pakistan (5), Georgia, Jordan or Lebanon (2), or other multiple areas (7).

Aim 1: A more current literature review

We now will address Aim 1, to provide a more current literature review. To do this, the authors attempted to conceptually map the 36 identified motivational factors onto the framework proposed by Willis-Shattuck et al. (2008). The mapping appears in the first and second columns of Table 2. While 22 of the factors could be mapped (e.g., "pay" fits easily into theme "financial rewards"), 14 factors could not (e.g., "work-life balance" does not fit easily into any theme). The poor fit encouraged us to develop a new framework. The mapping of the motivational factors onto the new framework appears in the third and fourth columns of Table 2. The new framework contains six motivational themes, including: working conditions, financial incentives, social incentives, career development, living conditions, and other. The evidence supporting each new theme is described below.

Working Conditions. Working conditions was mentioned in 54 studies as influencing motivation. The most frequently identified factors within this theme were the availability of equipment/supplies (33), and workload/staffing (24). The availability of equipment was identified as a key factor for whether healthworkers would take up rural work (Chhea et al., 2010; Hanson &

Jack, 2010; Penn-Kekana et al., 2005; Robyn et al., 2012; Zinnen et al., 2012). Healthworkers in Mathauer & Imhoff's (2006) study identified the availability of equipment and supplies as the primary change that might motivate them. Agyepong et al. (2004) and Luboga et al. (2011) both identified the poor availability of equipment and supplies as decreasing motivation. Some studies cited frustrations with a wide range of resource constraints, such as a lack of computers for record keeping (Jack et al., 2013), a lack of blankets (Ashmore, 2013), and a lack of lifesaving drugs (Mbilinyi, Daniel, & Lie, 2011).

High workload and inadequate staffing decreased motivation. Manongi, Marchant, and Bygbjerg (2006) identified understaffing as having various negative consequences for services, and Prytherch et al. (2012) found workload to be a main discouraging factor. van der Doef (2012) found that burnout among healthworkers was strongly correlated with poor information and high workloads. Several other studies identified workload as a subsidiary factor influencing motivation (Hagopian et al., 2009; Lievens et al., 2011; Prytherch et al., 2013). Three discrete choice experiments identified workload as a significant factor influencing job choices. However, other researchers have found that workload is often not highly ranked highly compared to the other factors (Hanson & Jack, 2008; Rao, 2012; Vujicic, 2010a; 2010b).

Financial Incentives. Financial incentives were the second most cited motivational theme (46 studies). Within this theme some studies identified pay as a motivating factor. Adzei et al. (2012) found that additional financial incentives increased healthworkers' motivation. However, pay, or the lack thereof, was more often discussed as a demotivating factor (Pillay, 2009; Songstad et al., 2012). Dieleman et al. (2003), Lievens et al. (2011), and Prytherch et al. (2012), found that pay negatively influenced motivation. Snow et al. (2011) found that healthworkers often did not move to a rural post, because their opportunities to make extra money would be lacking, e.g., moonlighting.

Some studies suggested that pay may matter less than other factors. Jack et al. (2013) describe pay as part of a broader lack of resources. Healthworkers in Franco et al. (2004) stated that

pay was critical for job satisfaction, but also mention other factors that may be more cost-effective for policy-makers to alter. Peters et al. (2010) found that healthworkers rated job content and work environment as more important than income.

Other studies found weak links between pay and motivation. In Mathauer & Imhoff's (2016) study, only 6% of participants mentioned salaries and allowances as factors that would motivate them to perform well. Stringhini et al. (2009) found that informal payments often decreased motivation. Songstad et al. (2012b) found that healthworkers preferred the long-term financial security offered by the public sector over better the better equipment offered by the church sector.

Social Incentives. Social incentives were identified in 37 studies as influencing motivation. Within this theme relationships with colleagues was cited as a factor increasing motivation in 19 studies (Ebuehi & Campbell, 2011; Jack et al., 2013; Leshabari, et al., 2008; Mokoka, Ehlers, & Oosthuizen, 2011; Sheikh et al., 2012a). Peters et al. (2010) found that 96% of healthworkers rated having good relationships with colleagues as more important than salary. Appreciation by managers was also identified as a motivating factor (Ashmore, 2013). Uys, et al. (2005) found a positive relationship between job supervision and satisfaction. In 12 studies community relationships were identified as increasing motivation (Prytherch et al., 2012; 2013; Razee et al., 2012).

A sense of vocational importance was identified as a motivating factor by 21 studies, e.g., helping people. Some studies found that a sense of vocation positively affected motivation. For instance, Mathauer & Imhoff (2006) found that vocation increased the amount of effort healthworkers believed they put into effort into their work. Prytherch et al. (2013) found that healthworkers described vocation as a key reason for joining the profession. Other studies mentioned vocation as acting alongside other factors (Ashmore, 2013; Pietersen, 2005; Prytherch et al., 2012; Sheikh et al., 2012b). On the other hand, vocation can also be viewed negatively.

Chandler et al. (2009) found that some healthworkers resented the beliefs that they would work as a 'calling' with low salary and poor equipment.

Career Development. Career development was identified in 31 studies as influencing motivation. Within this theme training was cited as a factor affecting motivation in 7 studies. Training generally increased motivation (Mullei et al., 2010; Oman et al., 2009; Peters et al., 2010; Prytherch et al., 2012; Reuter & Couper, 2007; Kotzee & Couper, 2006). However, Mbilinyi, Daniel, and Lie, (2011) found that training could be a demotivating factor for lower cadres of healthworkers who found themselves picking-up work when senior colleagues attended training. Sipsma et al. (2012) found that training did not improve performance.

The opportunity to obtain further qualifications was identified as a factor influencing motivation in 14 studies. In Rao (2012), doctors rated the opportunity to obtain further qualifications highly. In Mangham and Hanson (2008), healthworkers rated having an early opportunity to upgrade their qualification as the second most important factor affecting their job choices. Other studies identified a lack of opportunities to obtain further qualifications as a demotivating factor (Lephoko et al., 2006; Malik et al., 2010).

Lack of promotion opportunities decreased motivation (Jack et al. 2013; Manongi, Marchant, & Bygbjerg 2006; Mbindyo et al., 2009; McAuliffe et al., 2009). Agyepong et al. (2004) and Alameddine et al. (2012) found that a lack of promotion opportunities increased healthworkers' intentions to quit. Snow et al. (2011) found that a lack of promotion opportunities was a key reason healthworkers did not want to practice in rural areas.

Living Conditions. Living conditions were identified in 28 studies as influencing motivation. Within this theme housing was identified as a factor in 13 studies, particularly related to working in rural locations (Prytherch et al., 2013; Rockers et al., 2005; Snow et al., 2011). Work-life balance was identified as a factor in nine studies, particularly by female healthworkers (Razee et al. 2012; Reuter & Couper, 2007; Sheikh et al., 2012b). Beyond these two factors, there were a

range of other factors identified that likely varied contextually. For instance, roads and transport is likely only an issue for very remote areas (Mokoka et al., 2011; Razee et al., 2012).

Other. Outside of the main themes, additional factors were more sparsely noted. These factors often involved individual-level differences, e.g., age, gender, and levels of work-experience (Hagopian et al., 2009; Jayasuriya et al., 2012; Malik et al., 2010). Other factors included distrust in the Department of Health (Ashmore, 2013), fear of infection (Mathauer & Imhoff, 2006, Mbilinyi, et al., 2011), political influences (Luboga et al., 2011), involvement of healthworkers in hospital affairs (Klopper et al., 2012), and lack of knowledge (Dieleman et al., 2003).

Aim 2: Evidence-based review of interventions

We now turn to Aim 2, to identify the best avenues for new evidence-based interventions. To do this, a narrower analysis was conducted with only the intervention articles. Twelve of articles described intervention studies, including: six literature reviews, five reports of policies, and one controlled trial. The studies discussed interventions applied individually or as part of composite, i.e., a bundle of simultaneously initiated interventions. The interventions were related to the following factors: pay, career development, compulsory rural service, target recruitment for rural area, supervision, professional support, and composite interventions. Below each factor is briefly reviewed.

Pay. Two studies looked at the effects of performance-related pay. One study found that performance-related pay increased healthworkers' performance quality (Peabody et al., 2011). The other study found little impact of performance-related pay, citing implementation difficulties as a possible cause (Witter et al., 2011b).

Three studies and four systematic reviews addressed pay level. While Lehmann, Dieleman and Martineau (2008), and Wilson et al. (2009) found mixed evidence, other studies found more positive effects. Chopra et al. (2008) found that bursaries in return for rural service after graduating increased motivation. Dieleman, Gerretsen, and van der Wilt, (2009) found that incentives can

improve performance and motivation. Antwi and Phillips (2012) found that pay improved retention, particularly among a mobile cohort of doctors. Dolea, Stormont, and Braichet (2010) found that a rural financial allowance positively influenced healthworkers' plans to stay in a rural area.

Pay was sometimes used as part of composite interventions. For example, in addition to introducing better pay, Zurn et al. (2010) reported changes in the way government posts were allocated to allow more flexible contracting. Similarly, Efendi (2012) found improved take-up of rural posts following policy changes involving improved financial incentives and contracts.

Career development. The evidence around opportunities for career development is mixed. Dieleman, Gerretsen and van der Wilt (2009) reviewed 21 studies and found that training interventions improved performance of certain tasks, but such improvements dissipated over time. Chopra et al. (2008) found no evidence on the effectiveness of training interventions. Rowe et al. (2005) found mixed results for on-the-job training interventions.

When looking at career development more broadly evidence is lacking. Dieleman, Gerretsen, and van der Wilt's (2009) review found no studies on education in interventions. Lehmann, Dieleman, and Martineau (2008) found only sparse evidence that doctors leaving posts did so because they lacked career development opportunities.

Compulsory service. Compulsory service is widely used to increase the number of available healthworkers. Lehmann, Dieleman, and Martineau (2008) report mixed success for compulsory service in attracting and retaining healthworkers. Wilson et al. (2009) found weak evidence for compulsory service in the long-term. Dieleman et al. (2011) reviewed three studies with a compulsory rural service component and found no evidence of long-term effectiveness.

Targeted recruitment. Healthworkers from a rural background and those exposed to rural practice as part of training are more likely to practice rurally. Reviews by Dolea, Stormont, and Braichet (2010), Wilson et al. (2009), and Lehmann, Dieleman, and Martineau (2008) all find studies supporting this conclusion.

Supervision. Supportive supervision improves healthworkers' performance. Dieleman, Gerretsen, and van der Wilt, (2009) found two studies showing improvements in performance linked to supervision. Rowe et al. (2005) found evidence linking supervision with audit and feedback to improved performance. Finally, Lehmann, Dieleman, and Martineau (2008) found case studies where supportive supervision improved motivation.

Professional support. Wilson et al. (2009) identified several studies showing the importance placed on professional support in rural areas by healthworkers, but no studies testing such interventions' effects.

Composite interventions. Several studies advocated using composite interventions. Lehmann, Dieleman, and Martineau (2008) reviewed eight composite interventions for the retention of healthworkers in rural areas. They tentatively found that bundled interventions were more successful than narrow interventions. Dieleman, Gerretsen, and van der Wilt, (2009) reached similar conclusions.

Discussion

The current article presents a review of what motivates healthworkers in LMICs to help policy-makers improve such workers' availability and performance. In comparison to the previous review by Willis-Shattuck et al., 2008, this review finds more support for social incentives. As with other reviews, this review finds a little evidence regarding interventions' effectiveness (Dieleman, Gerretsen, & van der Wilt, 2009; Dolea, Stormont, & Braichet, 2010). This is striking given the current review's inclusive approach.

The current review's findings have implications for policy. As the evidence for interventions' effectiveness is still sparse, interventions should be evaluated in small-scale trials before their widespread implementation. When designing such interventions policy-makers should consider whether more than one intervention could be run simultaneously (a composite

intervention) and the potential cost-effectiveness of each manipulated factor, e.g., social vs pay intervention.

Several limitations of the current review should be noted. First, as there is no common language in this research area a targeted keyword search is problematic. Some articles were likely missed. Second, because the studies reviewed include heterogeneous methodologies, the conclusions drawn here are not as precise as they would have been if only one type of intervention was examined.

Notwithstanding the current review updates policy-makers on the evidence available to improve healthworkers' availability, performance. By combining a heterogeneous set of research the current review provides more informed recommendations focused around key motivational themes. The current review identifies gaps in the evidence-base and signposts fruitful research areas. The critical gaps identified include: a lack of evidence for effective interventions; a lack of evidence describing how context determines what influences motivation; and a cost-effectiveness analysis of interventions. Clear evidence on what works and how to implement it is needed, so that the next review can provide much firmer guidance.

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Table 1: Search terms used in the literature search.

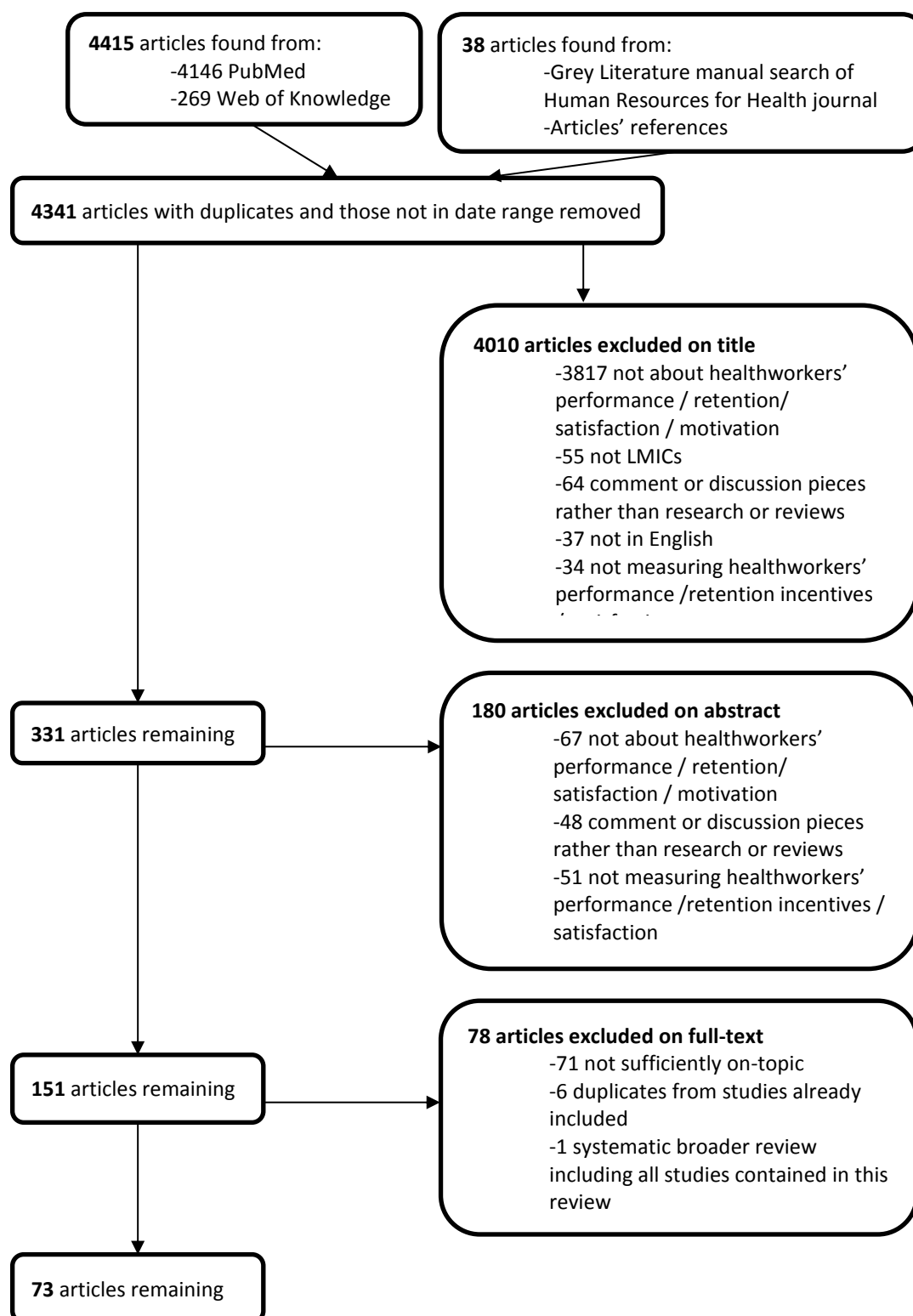
Concept:	Search terms used:
Healthworker	doctor, doctors, health worker, healthworker, medical worker, nurse, nurses
LMICs	Africa, developing countries, developing country, LMICs, low and middle income countries, low income countries, middle income countries, Southeast Asia
Motivation	brain drain, health worker migration, incentive, incentives, medical migration, motivation, performance improvement, performance management, retention, reward, satisfaction, quality improvement

Table 2: Grouping of the factors identified in articles into the themes proposed by the previous (columns 1 and 2) and current literature reviews (columns 3 and 4). The number of articles identified for each is given in parentheses.

Factors	Motivational Themes proposed by Willis-Shattuck et al. (2008) review	Factors	Motivational Themes proposed by the current review
<ul style="list-style-type: none"> • Workload / staffing • Availability of equipment and supplies 	Resource availability	<ul style="list-style-type: none"> • Workload / staffing (24) • Availability of equipment and supplies (33) • Working conditions • Motivational job properties • Stable job / pension • Quality of management / leadership • Supervision • Sector • Decentralisation of decision making 	Working conditions (54)
<ul style="list-style-type: none"> • Working conditions • Physical infrastructure 	Hospital infrastructure		
<ul style="list-style-type: none"> • Pay • Ability to generate income • Pay for performance • Informal payment 	Financial rewards	<ul style="list-style-type: none"> • Pay • Ability to generate income • Pay for performance • Informal payment 	Financial incentives (46)
<ul style="list-style-type: none"> • Patient relationship • Community engagement • Appreciation of managers • Peer relationships 	Recognition/appreciation	<ul style="list-style-type: none"> • Patient relationship • Community engagement (12) • Appreciation of managers • Peer relationships (19) • Pride in organisation • Vocation 	Social incentives (37)
<ul style="list-style-type: none"> • Promotion opportunities • Career intent • Further qualifications 	Career development	<ul style="list-style-type: none"> • Promotion opportunities • Career intent • Further qualifications • Training • Rural content in training 	Career development (31)
<ul style="list-style-type: none"> • Training • Rural content in training 	Continuing education		
<ul style="list-style-type: none"> • Education opportunities for children • Availability of health care • Perception of safety • Work-life balance • Place of work • Roads and transport • Housing 	Other	<ul style="list-style-type: none"> • Education opportunities for children • Availability of healthcare • Perception of safety • Work-life balance • Place of work • Roads and transport • Housing 	Living conditions (28)

Factors	Motivational Themes proposed by	Factors	Motivational Themes proposed by
	Willis-Shattuck et al. (2008) review		the current review
		<ul style="list-style-type: none"> Physical infrastructure 	
<ul style="list-style-type: none"> Other Demographic Rural background Rural background of spouse Stable job / pension Motivational job properties Vocation 		<ul style="list-style-type: none"> Other Demographics Rural background Rural background of spouse 	Other (17)

Figure 1. Study flow diagram for the literature search.



Appendix A: Data extraction template

Information extracted	Comments
Main focus of study	Description
Year of publication	
Country	
Main Findings	Description
Sample size	The number of healthworkers data has been gathered from in the course of the study
Setting	Primary / secondary care Urban / rural
Population	The type of healthworkers being asked, e.g. doctors, nurses, clinical officers.
Methodology	Description of the methodology used: e.g. Qualitative interviews, surveys, DCEs.
36 Factors identified: factors identified as potentially influencing motivation / satisfaction / retention.	<p>A detailed list of potential categories was developed from the literature, and then expanded to incorporate key themes from all papers as necessary.</p> <p>Categories:</p> <ul style="list-style-type: none"> - Availability of health care - Ability to generate income - Appreciation of managers - Availability of equipment and supplies - Career intent - Community engagement - Decentralisation of decision making - Demographic characteristics: age, sex, marital status - Education opportunities for children - Further qualifications - Housing - Informal payment - Motivational job properties: allows for challenge - Pay level - Payment for performance - Patient relationship - Perception of safety - Peer relationships - Physical Infrastructure - Place of work - city vs town / links to area - Pride in organisation - Promotion opportunities - Quality of management / leadership - Roads and transport - Rural background - Rural background of spouse - Rural content in training - Sector - Stable job and / or pension - Supervision, including feedback - Training - Vocation /intrinsic satisfaction from work

Information extracted	Comments
	<ul style="list-style-type: none"> - Workload / staffing - Working conditions - Work-life balance - Other
Factors identified: interventions	<p>A detailed list of potential categories was developed from the literature, and then expanded to incorporate key themes from all papers as necessary.</p> <p>Categories:</p> <ul style="list-style-type: none"> - Compulsory service, - Improving pay, - Payment for performance, - Improving living conditions, - Targeted recruitment, - Continuous training, - Professional support, - Initial training emphasises rural issues or includes a rural component, - Rural medical schools or specialties, - Political drive & will, - Supervision & audit with feedback.

Appendix B. Summaries of the articles included in this review

Survey Studies										
Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Adzei & Atinga (2012)	To explore the influence of financial and non-financial incentives on healthworker motivation and retention.	Motivation and retention	Ghana	Found both financial incentives - salary level, rural payment, and commitment based payments - and non-financial incentives: leadership skill and supervision, opportunities for continuing professional development and availability of infrastructure and resources to influence healthworker motivation and retention.	Moderate / Low	285	Rural	Secondary	HWs	NA
Agyepong et al. (2004)	To understand what motivates and demotivates healthworkers, and their overall levels of motivation	Satisfaction	Ghana	Found low levels of motivation, and a number of financial and non-financial 'obstacles' to motivation including salaries too low to live on, lack of essential equipment and supplies, delayed promotions, transport difficulties, housing and training.	Moderate	617	Both	Both	HWs	Urban / rural

Survey Studies										
Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Alameddine et al. (2012)	To assess levels of burnout and likelihood to quit in primary healthcare workers, and potential factors contributing to them.	Retention	Lebanon	Found high levels of burnout and 40% intention to quit. The three most cited factors influencing intention to quit were pay, better opportunities internationally and lack of professional development. Regression analysis showed burnout, lower levels of education and lower time in post all associated with intention to quit.	Moderate	755	Both	Primary	HWs	Education and time in post both influenced intention to quit
Chandler et al. (2009)	To understand the reasons for low performance among clinicians, and then explore the factors that contribute to low motivation.	Motivation	Tanzania	Found environmental factors were most often discussed by healthworkers as affecting motivation, including pay, perception of status, and organisational, social and physical work environments. Regression analysis found salary a 'pre-requisite' for motivation: higher salary was associated with higher internal motivation.	Strong	177	Both	Secondary	Clinical officers	Age, salary level.

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Delobelle et al. (2011)	To understand job satisfaction, intent to leave and correlates in nurses.	Satisfaction and retention	South Africa	Nurses reported satisfaction with work content and peer relationships and dissatisfaction with pay and work conditions. The study found job satisfaction to be associated with time in post, professional rank and turnover intent. Turnover intent was influenced by job satisfaction, age and education. Satisfaction with supervision was the only facet significantly explaining turnover intent when controlling for age, education, years of nursing and unit tenure.	Moderate	143	Rural	Primary	Nurses	Differences according to age and education
Dieleman et al. (2006)	To understand motivating and demotivating factors for healthworkers, and whether current performance management tools supported motivation.	Motivation	Mali	Found the main motivators were related to responsibility, training and recognition, and salary. They also found poor implementation of performance management tools, which could be contributing to low motivation.	Moderate	367	Both	Both	HWs	Differences between cadres and rural / urban healthworkers

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Ebuehi & Campbell (2011)	To understand satisfaction and contributing factors for Nigerian clinicians	Satisfaction	Nigeria	The majority of healthworkers liked their current job – with contributing factors identified as pay, relationships with colleagues, job prospects and career development opportunities. A number of factors likely to attract healthworkers to rural jobs were identified, including better working conditions, good support systems, opportunities for career development, financial incentives, better living conditions and family support systems.	Moderate	179	Both	Primary	HWs	Rural / urban
Franco et al. (2004)	To assess motivational outcomes and determinants for healthworkers	Motivation and satisfaction	Jordon & Georgia	Healthworkers stated that pay was critical for their job satisfaction, however a number of other factors were related to motivational outcomes and the study suggests they may be more cost-effective to influence. Non-financial incentives identified as contributing to healthworker motivation include self-efficacy, pride, management openness, job properties, and values.	Strong	Around 1000	Both	Secondary	HCWs	Individual factors, countries, professions, organisations

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Hagopian et al. (2009)	Aimed to measure job satisfaction and correlates and reasons for possible intent to leave in a nationally representative sample of healthworkers.	Satisfaction	Uganda	Found a number of factors contributing to job satisfaction: jobs being a good match with skills and experience, satisfaction with salary, happy with supervisor, manageable workload, enjoyable job and job security. Negative factors affecting satisfaction included salary, working and living conditions, and workload.	Moderate	641	Both	NA	HWs	Cadre, age, and sector.
Jayasuriya et al. (2012)	To assess job satisfaction and factors correlating with satisfaction in nurses.	Satisfaction	Papua New Guinea	Work climate and supervisory support were the biggest predictors of satisfaction in nurses, followed by ownership of the facility (government / church) and community support. In aggregate these factors explained 35% of the variation.	Moderate	344	Rural	Primary	Nurses	Age and experience.
Kekana, Du Rand & Van Wyk, (2007)	To assess the job satisfaction of nurses and contributing factors.	Satisfaction	South Africa	Found the majority of nurses dissatisfied with working conditions and emotional climate, but satisfied with social climate. Workload, pay and levels of pressure were the key dissatisfying issues.	Low	39	Both	Secondary	Nurses	NA

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Klopper et al. (2012)	To understand the practice environment, job satisfaction and burnout of critical care nurses.	Satisfaction	South Africa	Found high levels of burnout among participants. Nurses were generally positive about their working environment, with the exception of adequate staffing and resource levels and good governance. Key negative influences on satisfaction were salary, lack of opportunities for advancement and lack of study leave.	Moderate	935	Both	Secondary	Nurses	NA
Lephoko, Bezuidenhout & Roos (2006)	To understand how different factors relating to the organisational climate influence job satisfaction.	Satisfaction	South Africa	Found nurses to be slightly satisfied with intrinsic factors (motivation, empowerment and organisational alignment) and dissatisfied with extrinsic factors (physical environment, career development and performance management).	Low	140	Both	Secondary	Nurses	NA

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Luboga et al., (2011)	To understand the satisfaction of doctors, and contributing factors to it.	Satisfaction , motivation	Uganda	Found high levels of dissatisfaction among doctors. The largest sources of dissatisfaction were pay, quality of management, availability of equipment and supplies, quality of infrastructure, staffing and workload, political influence, location and lack of professional development.	Moderate	37	Both	Secondary	Doctors	NA
Malik et al. (2010)	To identify the determinants of job motivation in doctors.	Motivation	Pakistan	Found 'Intrinsic and socio-cultural factors like serving people, respect and career growth' were important motivators. De-motivators were largely organisational: pay and working conditions and workload meaning less personal / social time.	Moderate	360	Both	Both	Doctors	Levels of care, gender and public / private sector.
McAuliffe et al. (2009)	To explore the link between perceived organisational justice and job satisfaction.	Satisfaction	Malawi	Found a strong correlation between perceived organisational justice (fairness of treatment, procedures and communication by management) and job satisfaction. Pay, promotion opportunities and satisfaction with current work assignments were all also linked with job satisfaction.	Moderate	126	Both	Both	HWs	NA

Survey Studies										
Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Mokoka, Ehlers & Oosthuizen, (2011)	To assess which factors would motivate nurses to stay at their current employers	Retention	South Africa	Found 90% of the surveyed nurses' decisions to stay with their current employers would be influenced by factors related to finances, safety and security, equipment and/or supplies, management, staff and patients.	Low	108	Both	Both	Nurses	NA
Peters et al. (2010)	To ascertain what healthworkers believe is important for satisfaction / motivation, and how much of these factors are present in their current job.	Satisfaction and motivation	India	Four groups of factors were identified as influencing motivation: job content and work environment, extrinsic benefits (income, employment benefits, time for family life etc.), autonomy and security and transparency (i.e. lack of corruption). Several factors more prevalent than income in an 'ideal' job.	Moderate / Strong	1916	Both	Both	Clinicians	Regional, sector
Pietersen (2005)	To measure the satisfaction and correlating factors of nurses in a hospital environment.	Satisfaction	South Africa	Found just over half of nurses to be generally satisfied with their jobs. Satisfying factors were the nature of the job itself and the financial stability of the hospital, while dissatisfiers were working conditions, pay, interaction with supervisors and organisational support.	Moderate	109	Urban	Secondary	Nurses	NA

Survey Studies

Study	Main focus of study	What surveying	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Pillay (2009)	To assess the job satisfaction and contributing factors in Nurses.	Satisfaction	South Africa	Pay, workload and available resources were the most frequently cited dissatisfies among public sector nurses, with pay and career development opportunities the most mentioned for their private sector counterparts.	Low	569	Both	Both	Nurses	Sector
Uys et al. (2004)	To measure the job satisfaction, self-esteem, views on supervision and factors influencing them.	Satisfaction	South Africa	Found satisfaction close to neutral, high self-esteem and low satisfaction with supervision. A slight relationship between supervision and satisfaction was identified, in addition to a link between self esteem and personal satisfaction with their contribution to the work.	Moderate	319	Both	Both	Nurses	NA
van der Doef, Mbazzi & Verhoeven (2012)	To understand levels of satisfaction, burnout and somatic complaints in nurses, and understand how these factors link to working conditions.	Satisfaction	Kenya, Tanzania, Uganda	Found high levels of burnout and somatic complaints. Low job satisfaction correlated to low financial reward and supervisor support. Burnout was correlated with poor information provision and high workload. Somatic complaints were correlated with physically demanding work conditions.	Moderate	309	Both	Secondary	Nurses	Sector

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Ashmore(2013)	To understand the differences in private and public work in south Africa, with a view to improving retention in the public sector	South Africa	Found differences in motivational and de-motivational factors between settings, for instance the poor resource availability, view of the department of health and career opportunities were strong de-motivators in the public sector (often emphasised as much at the lower wages), while de-motivators in the private sector included the lack of a team environment and less opportunity to feel 'relevant'.	Moderate / Strong	28	Urban	Secondary	Doctors	
Chhea et al. (2010)	To understand how rural healthworkers treating tuberculosis patients operate, and the barriers / motivating factors they experience.	Cambodia	Found a number of demotivating factors, both them into institutional (e.g. structure of the health system, lack of staffing) and personal (e.g. optimism, status, and personal finances). They emphasise the importance of individual financial coping strategies in retention, and that these may also be de-motivating factors – e.g. diverting patients to private clinics.	Low	10	Both	Both	HWs	

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Jack et al. (2013)	To explore the factors motivating mental healthworkers - looking at both reasons for joining the profession and motivational factors at work.	Ghana	Many of the factors found affecting motivation were to do with relationships. Motivating factors included some specific to mental health – an academic interest in psychiatry, improved personal relationships, and some broader factors - including a desire to help patients and good relationships with colleagues. Demotivating factors were a lack of resources, a rigid hierarchy, low feedback on performance and a lack of career opportunities.	Moderate	28	Both	Secondary	HWs	
Kotzee & Couper (2006)	To understand what interventions doctors think would help them stay in rural areas.	South Africa	Identified a large number of interconnected themes and recommended multifaceted intervention to fix them. Themes involved increasing the recognition of rural practice, better pay and benefits, better living conditions, further education and better professional support.	Moderate / Low	10	Rural	Both	Doctors	
Leshabari et al. (2008)	To assess motivation and contributory factors for healthworkers.	Tanzania	High levels of dissatisfaction among staff were found, with a number of factors contributing. Sources of dissatisfaction included low salary, the frequent unavailability of necessary equipment and resources, poor performance evaluation and feedback, poor communication and a lack of participation in decision-making processes.	Moderate / Low	448	Urban	Secondary	HWs	

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Mathauer & Imhoff (2006)	To understand motivational factors for healthworkers, focusing on non-financial incentives	Kenya & Benin	Professional ethos was consistently mentioned as a motivator for health professionals, with the work environment and equipment a secondary factor, and pay / allowances mentioned by relatively few participants. Improving the availability of equipment / supplies for the job was the most mentioned factor for improving professionals' motivation.	Moderate / strong	99	Both	Both	HWs	Differences between countries, sector and cadre
Mbilinyi, Daniel & Lie (2011)	To understand how HIV treatment has affected healthworker motivation and views on their jobs.	Tanzania	Found a number of factors related to HIV treatment negatively impacting motivation - including time out for training, trust between the community and healthworkers, and logistical problems in the health system.	Moderate	30	Both	Both	HWs	Differences between cadres
Oman, Moulds & Usher (2009)	To understand the main influences on job satisfaction from specialist trainees, some of whom had since left the public sector.	Fiji	Found three main categories of factor that influenced satisfaction: professional growth, service and patient care, and recognition - with dissatisfying factors falling into these themes.	Moderate	47	Both	Secondary care	Doctors	NA

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Prytherch et al. (2012)	To understand the issues the motivation of rural maternal and newborn healthworkers.	Tanzania	Found positive influences on motivation included community appreciation, perceived support from government / donor, and the opportunity to learn. Negative influences were mostly financial, with poor equipment also mentioned.	Moderate	25	Rural	Both	HWs	Lower cadres were more demotivated
Prytherch et al. (2013)	To understand motivation and views on incentives in rural maternal and neonatal healthworkers.	Burkina Faso, Ghana & Tanzania	High levels of commitment to remaining as healthworkers were expressed, with lower levels of commitment to working rurally, and concerns over poor quality care. Positive influences on motivation included appreciation of the community and managers, and negative influences the lower perceived status of rural work and low pay.	Moderate	75	Rural	Both	HWs	Differences between countries
Razee et al. (2012)	To understand the difficulties faced by rural healthworkers in social factors - for instance the reaction of the community, personal safety.	Papua New Guinea	Found the key issues discussed as affecting motivation were a supportive & respectful local community – with functioning community ‘ownership’ of health facilities, family responsibilities particularly for female healthworkers, the perceived safety of the area / community, and health beliefs and attitudes of patients and community members (for instance believing in traditional remedies).	Moderate	33	Rural	Primary	HWs	NA

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Reuter & Couper (2007)	To elicit the factors that make people choose to practice and stay practicing rurally.	South Africa	Found a number of themes influencing decisions to take / stay in a rural job - including previous exposure to a rural environment, opportunities for education and social support.	Moderate	15	Rural	Both	Doctors	
Sheikh et al. (2012b)	To explore why rural practitioners have chosen to continue to practice in rural government posts.	India	A number of environmental and personal factors were cited for staying on. Factors include relationships with the community and colleagues, family considerations, enjoying rural life and a sense of vocation.	Moderate	37	Rural	Primary	Doctors	NA
Snow et al. (2011)	To understand doctors' views on what could influence rural service, and then develop policy recommendations for improving it.	Ghana	Discussions with doctors suggest that while salary is important, it is career development priorities that are keeping doctors in urban centres. Short-term service in rural areas would be more appealing if it were linked to special mentoring and/or training, and led to career advancement.	Moderate	84	Both	Both	Doctors	NA

Interview Studies									
Study	Focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Witter et al. (2011a)	To understand doctors' views on the different factors influencing their willingness to work in a rural area.	Vietnam	Four typical 'directions of travel' are identified for Vietnamese doctors - from lower to higher levels of the system, from rural to urban areas, from preventive to curative health and from public to private practice. Substantial differences in income from formal and informal sources all reinforce these preferences. Working conditions, training opportunities, living conditions and career development were also mentioned as affecting recruitment and retention.	Moderate / low	32	Both	Both	HWs	Regional
Zinnen et al. (2012)	To ascertain healthworkers' motivation, and factors / to improve it.	Tanzania	Found a high level of stability in healthworkers, and a preference for the stability and pension that the public sector provided. Healthworkers described themselves as dissatisfied, with a lack of resources, high workload, poor hospital infrastructure and poor management all contributing.	Moderate / low	285	Rural	Secondary	HWs	

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Hanson & Jack (2010)	To understand clinicians' preferences for different interventions to improve chances of working in a rural area.	Ethiopia	Found the most important incentives for doctors were financial and provision of housing, while nurses preferred better equipment and better availability of supplies.	Moderate	219	Both	Secondary	Doctors	Cadre
Mangham & Hanson (2008)	To assess the factors influencing nurses' job choices on.	Malawi	Found the six factors investigated all had an impact on job choice, with pay, opportunities to upgrade qualifications and housing the factors having the most influence.	Strong	107	Both	Secondary	Nurses	NA
Mullei et al. (2010)	To understand the preferences of upgrading nurses and trainees for different jobs	Kenya	Found concerns with rural employment include career stagnation, loss of training opportunities and several perceived social disadvantages. Career development, permanent contracts and salary were identified as important factors in job decisions.	Moderate	250	Both	NA	Nurses	
Penn-Kekana et al. (2005)	To assess a range of factors relating to nurses' motivation, retention and likelihood to emigrate.	South Africa	Pay, a well equipped facility and good management were the three most highly rated factors in making job decisions.	Moderate	27 facilities	Rural	NA	Nurses	

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Rao, (2012)	To examine the effect of job attributes on healthworker choices: both in service healthworkers and those in training	India	Found salary and qualifications had the greatest impact on job preferences. There were differences in the preferences of students and in service healthworkers.	Moderate	406	Rural	NA	Clinicians	Cadre and students / in service HWs
Robyn et al. (2012)	To elicit healthworker preferences for different mechanisms of community based insurance payments.	Burkina Faso	Found healthworkers preferred schemes without results-based payments, and also absolute rather than relative performance payments.	Moderate	176	Both	NA	HWs	NA
Rockers et al. (2013)	To assess the factors influencing choice of rural posts for nurses, and the differences in these factors between practicing and student nurses.	Laos	For both groups, choice of job posting was strongly influenced by salary and direct promotion to permanent staff. Practicing nurses had lower preference for housing allowance and housing provision as well as provision of transportation for work and personal use than students.	Moderate	249	Rural	NA	Nurses	NA

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Vujicic (2010)	To understand the factors affecting rural job choices of nurses and midwives.	Liberia	Found preferences for rural work vary considerably by exposure to rural areas. Pay levels and improving transportation were the two most cost effective policy options identified (despite pay ranking relatively lowly in relative importance of factors).	Moderate	197	Both	NA	nurses	NA
Vujicic et al. (2010)	To compare the preferences of medical students and in service doctors in making job decisions - particularly for rural postings.	Vitenam	Found significant differences between preferences for medical students and in-service doctors. The most important attribute excluding salary was rural/urban location for in-service doctors, and the opportunity of long-term education for medical students.	Moderate	292	Doctors	NA	Doctors	Students and in-service doctors
Focus Group Studies									
Study	Main focus	Countr y	Main Findings	Grading	Sample size	Urban /rural	Primary / secondary care	Cadre	Differences between groups

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Campbell et al. (2011)	To understand the sources of motivation and frustration for healthworkers delivering Antiretroviral Treatment in rural settings.	Zimbabwe	Healthworkers found the changes in patients' quality of life brought about by treatment to be a big motivator. Frustrations expressed were mainly around resource shortages, particularly medication.	Moderate	25	rural	NA	HWs	NA
Dieleman et al. (2003)	To understand motivating and demotivating factors for rural healthworkers – with a view to improving performance	Vietnam	Found the main motivating factors for healthworkers were appreciation by managers, colleagues and the community, a stable job and income and training. The main de-motivating factors were related to low salaries, difficult transportation and heavy workloads.	Moderate	56	Rural	Primary	HWs	NA
Lievens et al. (2011)	To understand the factors affecting job choice for healthworkers in Ghana.	Ghana	Found a number of attributes driving job choice, including salary (most importantly), benefits and allowances, access to training, workload, the availability of medical equipment, and social recognition.	Moderate	63	Both	NA	HWs	NA
Manongi, Marchant & Bygbjerg (2006)	To explore the motivation, satisfaction and frustrations of healthworkers.	Tanzania	The key factors raised by healthworkers were workload in the context of staff shortages, supportive supervision from line managers and transparency in career development opportunities.	Moderate	64	Both	Primary	HWs	NA

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Mbindyo et al. (2009)	To assess levels of motivation and contributing factors among healthworkers.	Kenya	A number of interrelated factors were identified contributing to motivation - including supportive management, salary, workload, fairness in opportunities, management working for change and national policy on promotions.	Moderate / Low	185	Both	Secondary	HWs	Age
Songstad et al. (2012a)	To understand the impact of implementing a performance management system and pay for performances on healthworkers and their motivation.	Tanzania	Found a strong focus on salary in healthworkers' discussions – with low salary cited as a cause for low motivation and performance pay thought a strong motivational tool.	Low	29	Rural	Primary	HWs	NA
Songstad et al. (2012b)	To understand in detail job preferences for rural healthworkers relating to the ownership of facilities.	Tanzania	Found a clear preference for public sector employment. The main reasons cited for this were better job security and the availability of pensions in the public sector. This preference was despite acknowledgement that the Church sector was better equipped and provided better care.	Low	62	Both	Both	HWs	NA

Discrete Choice Experiment Studies									
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban / rural	Primary / secondary care	Cadre	Differences between groups
Stringhini et al. (2009)	To explore the role of informal payments in job satisfaction and motivation	Tanzania	Informal payments were acknowledged as widespread. They seem to impact negatively on motivation and satisfaction of healthworkers - through fear of detection, concerns of the fairness of payments received by senior staff, and feeling 'enslaved' to bribing patients.	Moderate	64	Both	Both	HWs	NA

Measurement Studies								
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban/rural	Cadre	Differences between groups
Brock, Lange & Leonard (2012)	To understand effects on doctors' performance of peer scrutiny and an 'encouragement visit' according to generosity	Tanzania	Generous clinicians provide higher quality care, and all clinicians respond to peer scrutiny and peer encouragement, with peer encouragement showing the greatest improvements in performance.	Strong	103	Rural	Clinicians	NA
Das, Hammer & Leonard (2008)	To describe and discuss the performance of doctors in LMICs, and potential reasons for this.	4 countries	Found low levels of knowledge in doctors practicing in LMICS, and additionally low levels of performance (measured by guideline adherence) compared to knowledge. The lowest quality care was experienced by the poorest patients.	Strong	4 studies	Both	HWs	Countries and type of institution
Leonard, Masatu & Vialou (2007)	To assess performance of doctors against clinical guidelines and what correlates with performance.	Tanzania	Found that training impacted knowledge, but type of organisation made more of a difference to actual performance measured by guideline adherence.	Moderate / Strong	80	Rural	Doctors	Cadres
Leonard & Masatu (2010)	Ethnographic observation of professionalism and its relationship to performance.	Tanzania	Found that clinicians exhibiting professionalism delivered high quality care with or without extrinsic incentives - and this group comprised 20% of their sample. Also found Clinicians operating in facilities with decentralised decision-making powers had a smaller 'know-do' gap.	Strong	80	Both	Clinicians	NA

Measurement Studies								
Study	Main focus	Country	Main Findings	Grading	Sample size	Urban/rural	Cadre	Differences between groups
Mæstad, Torsvik & Aakvik (2010)	To understand the link between workload and quality of care in a resource-constrained setting.	Tanzania	Found no link between workload and effort per patient (in an observed diagnostic task in clinics). They did find links between levels of training and quality.	Strong	159	Rural	Clinicians	NA
Sipsma et al. (2012)	To understand the impact of training, supervision and incentives on the quality of provision in maternal and newborn healthcare.	Rwanda	Found wide variation in adherence to recommended practices, and no evidence that training, supervision or incentives were consistently associated with better practice.	Moderate	455 facilities	Both	HWs	Regions and types of facility

Intervention Studies								
Title	Main focus of study	Country	Main Findings	Grading	Sample size	Urban / rural	Cadre	Type of study
Antwi & Phillips (2012)	To assess the impact of a pay increase on worker retention in Ghana.	Ghana	Found increased pay improves retention in those cadres who are likely to leave the public sector, often to emigrate – aged 20-35. A 10% increase in pay	Moderate / Low	NA	Rural	HWs	Observational

Intervention Studies								
Title	Main focus of study	Country	Main Findings	Grading	Sample size	Urban / rural	Cadre	Type of study
			resulted in a 0.9-1.8 percentage point reduction in annual attrition.					
Chopra et al. (2008)	A review of systematic reviews looking at the effectiveness of different policy options to improve different aspects of human resources: supply, distribution and performance of healthworkers.	Many	Found a general paucity of evidence. Available evidence focused on organisational mechanisms for improving human resources such as task shifting, quality improvement and changes to workflow rather than individual mechanisms.	Moderate	55 papers	Rural	HWs	Systematic review
Dieleman, Gerretsen & Van (2009)	Systematic realist review focusing on human resource management interventions to improve healthworker performance.	Many	Found that combined interventions, continuing educations and local quality initiatives could be successful, and success was different in different contexts. In addition, few interventions had been implemented in different contexts, making understanding important contextual factors problematic.	Moderate	9 reviews with a LMIC component	Both	HWs	Systematic review
Dolea, Stormont & Braichet (2010)	A literature review of interventions to attract and retain healthworkers in underserved	Many	Found a lack of evidence, and strongly argues for better future research into the topic. Their findings confirm previous reviews – with evidence for	Strong	27 papers - 8 with a	Rural	HWs	Systematic review

Intervention Studies								
Title	Main focus of study	Country	Main Findings	Grading	Sample size	Urban / rural	Cadre	Type of study
	and rural areas - high and low income countries		targeted rural selection, multifaceted training interventions, financial incentives, and compulsory service / bonding schemes.		LMIC component			
Efendi (2012)	To assess the success of changing contracting and pay in improving staffing in remote areas.	Indonesia	Found improving financial incentives and making contracts more flexibility improved the availability of healthworkers in remote areas, however considerable challenges still remained.	Low	NA	Rural	HWs	Observational
Lehmann, Dieleman & Martineau (2008)	To systematically review the evidence of what works in attracting and retaining staff to rural areas in LMICs.	Many	Found a lack of evidence, and a complex set of factors influencing attraction and retention of healthworkers in rural areas. Also found composite interventions (suggested as covering living conditions, working conditions and development opportunities) are more likely to be successful than those focusing on a single aspect.	Strong	110 papers	Rural	Clinicians	Systematic review
Peabody et al. (2011)	To assess the impact on quality of care of a performance-related bonus and provider-level incentives.	Philippines	Found measurable improvements in quality of care under performance related pay and hospital-level financial incentives. This effect was maintained over the medium term – with improvements still evident 36 months after the start of the intervention, however	Strong	617	Both	Doctors	Controlled trial

Intervention Studies								
Title	Main focus of study	Country	Main Findings	Grading	Sample size	Urban / rural	Cadre	Type of study
			there were also improvements in the control group in the latter part of the study.					
Rowe et al. (2005)	Systematic review looking at interventions to improve performance of healthworkers.	Many	Found a general scarcity of evidence, particularly of cost effectiveness information. In terms of interventions found some differences in HIC and LMIC results, and evidence for supervision and audit with feedback, and little for dissemination of written guidelines without other interventions.	Moderate	27 studies - majority from HICs	Rural	HWs	Systematic review
Wilson et al. (2009)	To comprehensively review the literature on what interventions help attract and retain healthworkers to rural and remote areas.	Many	Categorised interventions against five mechanisms: Selection, Education, Coercion, Incentives and Support. They found evidence for selection and support, and some evidence for incentives.	Moderate	110 papers – mix of HICs and LMICs	Both	HWs	Literature review
Witter et al. (2011b)	To evaluate the impact of a pay for performance scheme as one aspect of a broader project on health system strengthening.	Pakistan	Found little impact of performance-related-pay, however there were several design and implementational issues identified with the programme.	Moderate	NA	Both	HWs	Observational

Intervention Studies								
Title	Main focus of study	Country	Main Findings	Grading	Sample size	Urban / rural	Cadre	Type of study
Zurn et al. (2010)	To understand the effects of changing contracting and allocations to posts in increasing numbers of rural healthworkers.	Senegal	Found changing the mechanism of recruiting to rural posts and improving the flexibility of contracting improved the numbers of rural healthworkers - but found some variation between regions in how well this policy worked.	Low	NA	Rural	HWs	Observational